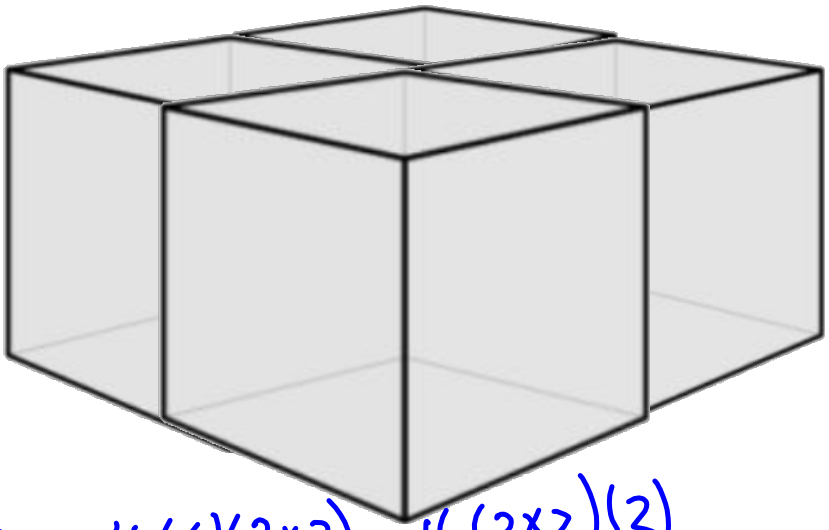
October 29, 2014

Warm Up Grade 9

Find the Surface Area of This Composite Object.
Each cube has edge length of 2 cm.



$S.A. = 4(6)(2\times2) - 4(2\times2)(2)$

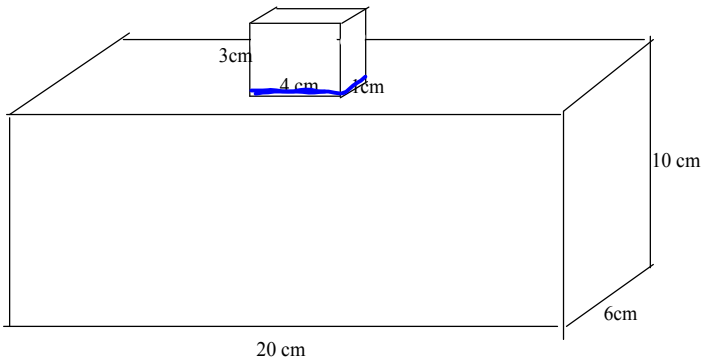
$= 96 - 32$

$= 64$

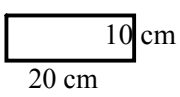
Determine the surface area of the composite object.

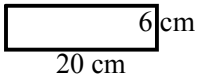
What effect does the overlap have on the calculation of the surface area?

*count bottom



STEP 1: You can calculate all of the surface areas of the larger rectangular prism





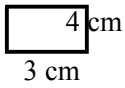
(20)(10)(2) (6)(10)(2) (20)(6)(2)

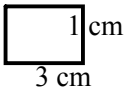
S.A. = 400 + 120 + 240
= 760 cm²

760 cm²

Step 2: Then calculate all of the surface areas of the smaller rectangular prisms

3x4x1





(3)(4)(2) (4)(1)(2) (3)(1)(2)

S.A. = 24 + 8 + 6
= 38 cm²

38 cm²

Step 3: Is there an overlap? SO must subtract the "overlapped AREAs"
recall overlap involes "two faces"

subtract 2 x (overlap area) (4)(1)(2) = 8

S.A. = 760 + 38 − 8
= 790 cm²

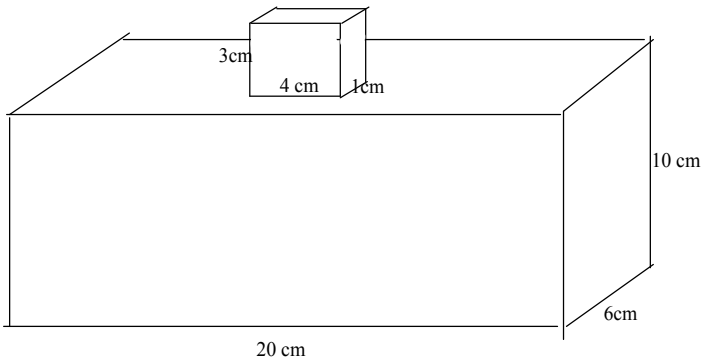
790 cm²

METHOD 2

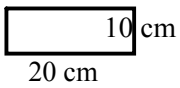
Determine the surface area of the composite object.

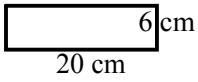
What effect does the overlap have on the calculation of the surface area?

*count bottom



STEP 1: You can calculate all of the surface areas of the larger rectangular prism



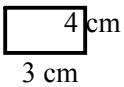


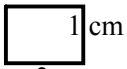
(20)(10)(2) (6)(10)(2) (20)(6)(2)

S.A. = 400 + 120 + 240
= 760 cm²

760 cm²

Step 2: Then calculate all of the surface areas of the smaller rectangular prisms THAT IS EXPOSED





(3)(4)(2) = 24 (4)(1) = 4 (3)(1)(2) = 6

only one (4 cm x 1 cm) roof

S.A. = 24 + 4 + 6
= 34 cm²

34 cm²

Step 3: Is there an overlap? SO must subtract the "overlapped AREA" on the roof of the larger .....itis the same as the (4 cm x 1 cm) block

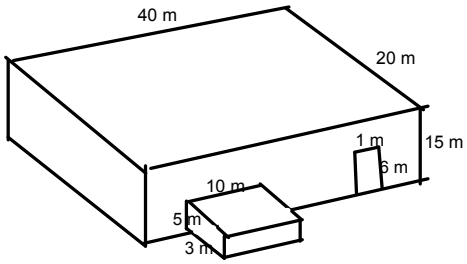
overlap = (4)(1)
= 4

S.A. Total = 760 + 34 - 4
= 790 cm²

790 cm²

Find the area of the warehouse with the attached storage space.

(Think if you were going to paint this....How much paint is needed???)



Step 1) Calculate the sides of all of the larger prism, exposed

area of roof: $(40)(20)$

area of left & right sides: $(20)(15)(2)$

area of front & back side: $(40)(15)(2)$

so total surface area of warehouse is:

$S.A. = 800 + 600 + 1200$

$= 2600\ m^2$

Step 2) Storage space consist of 3 walls and a roof

area of roof: $(10)(3)$

Area of front: $(10)(5)$

Area of left side and right side: $(3)(5)(2)$

So surface area of the storage space is:

$S.A. = 30 + 50 + 30$

$= 110\ m^2$

THUS

Area of back of storage that overlap the warehouse = 10 x 5 = 50

$TOTAL_{SA}$ = 2600 + 110 - 50 =

$= 2660\ m^2$

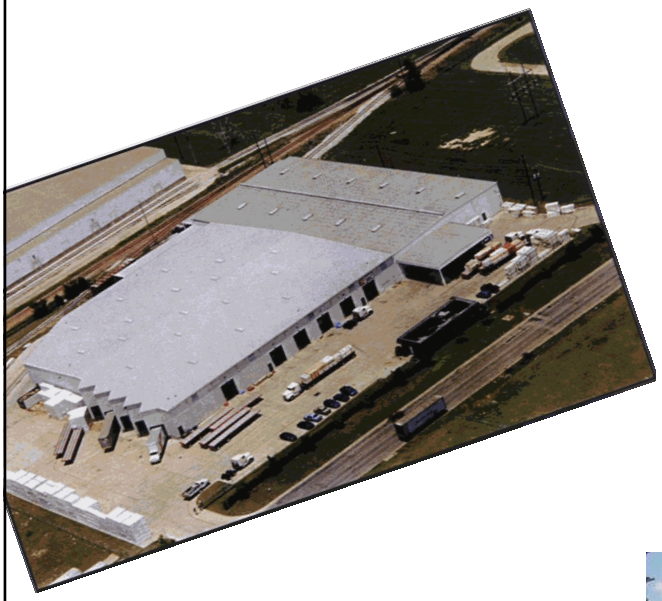
Finally we do not paint the door so subtract the are of the door

Area of door = 1 x 6

$= 6\ m^2$

Area to be painted = 2660 - 6

$= 2654\ m^2$



See Page 29

Example 3

Warehouse Question

Practice page 31

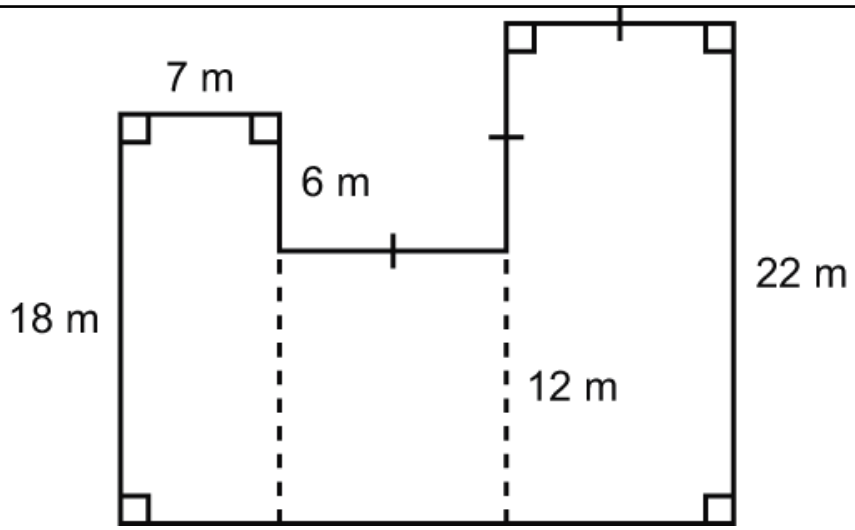
Questions: 8a, b, c
10
11

Hi

8. Subtract the area of the overlapping faces when calculating the total surface area of the composite object.
a) Surface area of the smaller rectangular prism:
Area of top, bottom, front, and back faces: 4(2 × 1) = 8
Area of left and right faces: 2(1 × 1) = 2
Surface area of the larger rectangular prism:
Area of top and bottom faces: 2(5 × 3)= 30
Area of front and back faces: 2(5 × 2) = 20
Area of left and right faces: 2(3 × 2) = 12
In square centimetres, total surface area – overlap = 8 + 2 + 30 + 20 + 12 – 2(2 × 1) = 68
b) Surface area of top rectangular prism:
Area of top and bottom faces: 2(2 × 2) = 8
Area of front, back, left, and right faces: 4(2 × 1) = 8
Surface area of middle rectangular prism:
Area of top and bottom faces: 2(4 × 3) = 24
Area of front and back faces: 2(4 × 2) = 16
Area of left and right faces: 2(3 × 2) = 12
Surface area of bottom rectangular prism:
Area of top and bottom faces: 2(6 × 4) = 48
Area of front and back faces: 2(6 × 3) = 36
Area of left and right faces: 2(3 × 4) = 24
In square centimetres, total surface area – overlap =
8 + 8 + 24 + 16 + 12 + 48 + 36 + 24 – 2(4 × 3) – 2(2 × 2) = 144

c) Surface area of the left rectangular prism:
Area of top and bottom faces: 2(2.5 × 4.5) = 22.5
Area of front and back faces: 2(5.5 × 2.5) = 27.5
Area of left and right faces: 2(5.5 × 4.5) = 49.5
Surface area of the middle rectangular prism:
Area of top and bottom faces: 2(3.5 × 3.5) = 24.5
Area of front, back, left, and right faces: 4(1.5 × 3.5) = 21
Surface area of the right rectangular prism:
Area of top and bottom faces: 2(2.5 × 5.5) = 27.5
Area of front and back faces: 2(2.5 × 6.5) = 32.5
Area of left and right faces: 2(5.5 × 6.5) = 71.5
In square centimetres, total surface area – overlap =
22.5 + 27.5 + 49.5 + 24.5 + 21 + 27.5 + 32.5 + 71.5 – 4(3.5 × 1.5) = 255.5

10. a) Do not include the base in the calculation.
Surface area of garage:
Area of roof: 7.8 × 5.0 = 39
Area of left and right walls: 2(5.0 × 3.8) = 38
Area of front and back walls: 2(3.8 × 7.8) = 59.28
Surface area of shed:
Area of roof: 3.9 × 2.5 = 9.75
Area of left and right walls: 2(2.5 × 3.8) = 19
Area of front and back walls: 2(3.9 × 3.8) = 29.64
In square metres, total surface area – overlap =
39 + 38 + 59.28 + 9.75 + 19 + 29.64 – 2(3.9 × 3.8) = 165.03
The surface area of the building is 165.03 m^2.
b) Surface area of the building, in square metres, without doors, window, and roof:
165.03 – (2 × 3) – (2 × 1) – (1 × 1) – (7.8 × 5.0) – (2.5 × 3.9) = 107.28
Cost of siding:
$15 × 107.28 = $1609.2
It will cost $1609.20 to cover this building with siding.



11. Divide the building into three rectangular prisms.
Each rectangular prism is 8 m tall.
Since this is a building, we do not include the area of the floor.
Surface area of left prism:
Area of roof: 18 × 7 = 126
Area of front and back walls: 2(8 × 7) = 112
Area of left and right walls: 2(18 × 8) = 288
Surface area of middle prism:
Area of roof: 10 × 12 = 120
Area of front and back walls: 2(10 × 8) = 160
Area of left and right walls: 2(12 × 8) = 192
Surface area of right prism:
Area of roof: 10 × 22 = 220
Area of front and back walls: 2(10 × 8) = 160
Area of left and right walls: 2(22 × 8) = 352
In square metres, total surface area of building – overlap =
126 + 112 + 288 + 120 + 160 + 192 + 220 + 160 + 352 – 4(12 × 8) = 1346